The above quotation is the tenor of that admirable article which ought to be read by every person interested in education and the welfare of his children and country.

Children are born with a love for nature which usually later leaves them. They are of an inquisitive turn of mind and admire flowers and birds while very young, but this is soon smothered instead of being fostered by text-book work and the common method of poking facts into reluctant brains in an ill-ventilated schoolroom by a teacher who knows all about the recent advances in pedagogy but nothing about the subject he is teaching.

The training of the senses of observation, of the faculty of reflection, and of the using of the hand, constitutes an education. One thus trained can get ten times more out of life than the bookworms who feed on second-hand facts.

The students — and the very youngest students — must be reached, and the manner of reaching them is through the teachers. For this purpose the new summer school at Avalon has been established. The work in natural history will be mostly out-of-doors. The students will go with the teachers out among the dunes, in boats about the bays and thoroughfares, among the marshes and along the shore, gathering plants and animals for study. The students in art will sketch right out among the bright-colored sand dunes and study the richness of color which characterizes those beaches and marshes by the sea.

Dr. Charles Dolley is the president and leading founder of this institution. He was formerly Professor of General Biology in the University of Pennsylvania. He was long a student and near friend of Dr. Joseph Leidy, whom, in his character and broadness of views, he resembles. He is a close student of nature, versed in both languages and science, and possessed of such personal magnetism and pleasing manners that he is always surrounded by many friends and admirers who are always helped by his never-failing enthusiasm and encouragement. A better person could not have been chosen for such a position.

The place selected for this summer school is a good one. Plenty of good material for science work is near at hand. It is the only beach on the coast where beautiful forests of red cedar and holly are still standing. There is a long even beach, unexcelled for bathing and carriage and bicycle riding. There are high white sand dunes and beyond vast stretches of salt marshes intersected by many bays, thoroughfares, and salt ponds. On the mainland there are forests of pines and many beautiful plants peculiar to the "low pine barrens of south Jersey."

For a sum not exceeding $50, including all expenses, a teacher can spend five weeks pleasantly and profitably at the seashore, not only bathing and enjoying the salt sea air and the other pleasures of such a result but breathing in a kind of knowledge which they will relish and impart to those under them and thus help to bring about this change in the manner of common school education for which many are hoping.

JOHN GIFFORD.
Swarthmore, Pa.

Early Man in Minnesota.

IN *The American Geologist* (April, 1893) Mr. Wm. H. Holmes has published another long article, this time endeavoring to show that there is no evidence whatever of the existence of early man in Minnesota. The article is very prettily illustrated with fanciful sketches, which Mr. Holmes's practice as an artist makes him to evolve from his inner consciousness, and which he employs in all his writings in place of arguments in support of his theory of the non-existence of palæolithic man in North America.

He says that "Besides the investigations of Professor Winchell and Miss Babbitt, no work has been done upon the archæology of this region, although other writers, notably Mr. Warren Upham, Professor G. F. Wright, and Mr. Henry W. Haynes, taking for granted the correctness of all the original observations and conclusions, have ventured to enlarge upon the material published."

The only "venturing" I have done has been to express to the late Miss Babbitt, who sent to me for examination a large quantity of pieces of quartz collected by herself, the conviction that these fragments were of artificial and not of natural origin. As Mr. Holmes calls them Indian refuse, I can scarcely be charged with very hazardous venturing. Miss Babbitt wrote to me that she had discovered them in undisturbed deposits of glacial origin. If this is true, as I have no reason to doubt it is, certain objects among them presenting the palæolithic type must of necessity be true palæolithic implements, and not, like many of a similar type that have been found on the surface, be of doubtful origin. Every one knows that such objects are also sometimes found in Indian shell-heaps and village sites. Accordingly, whether any particular object can be positively identified as a true palæolithic implement or not depends upon the conditions of its occurrence. That is a question for geologists to answer, and if they pronounce the site to be of glacial origin the probability is very great that similar objects found in the immediate vicinity are also palæolithic implements. This is the state of the question with respect to the objects found in the Trenton gravels. How does this reasoning apply to the so-called Babbitt quartzes? The glacial man in fashioning palæolithic implements must have produced a great many splinters and fragments, just as the Indian did in producing his implements. If any particular locality offers only one available material to work with, the refuse of palæolithic man and of the Indian must be precisely alike. I understand this to be true of the out-cropping of veins of quartz in the slate in the neighborhood of Little Falls, Minnesota. No one doubts that Indian relics are found in that vicinity, as is always the case at all good fishing sites like that. But Indian implements and palæolithic implements are very different in appearance, and no skilled archæologist will mistake one for the other. I have seen palæolithic implements that Miss Babbitt said she had found in undisturbed glacial deposits. This is positive, undisputed testimony. What has Mr. Holmes to say in answer to it? I will quote his words precisely: "My investigations have shown that the glacial quartzes were probably not originally included in the loam but rather that they were introduced into it in post-glacial times, and that they were rude because mere shop refuse, the period of occupation thus, in all probability, corresponding to that of our historic aborigines." This may be very convincing to some people, but to my mind it is not quite satisfactory. Professor Winchell says that the quartz fragments are to be found over a very extensive region, "up and down the river an unknown distance," and extending "downward three or four feet" in "hard-pan drift containing boulders." That is something quite different from "loam," the word persistently employed by Mr. Holmes in speaking of the fragments. Loam is defined by Webster as meaning "a mixture of clay and sand with organic matter to which its fertility is chiefly due." If this is the nature of "hard-pan drift, containing boulders," I am incapable of understanding ordinary language. Professor Winchell's words can only be understood of undisturbed glacial deposits. But Mr. Holmes says "there is nothing in the conditions and phenomena of the site that will enable us to say whether the beginning of the quartz-working dates back one hundred or one thousand years." He reaches this sweeping conclusion by imagining that Indian refuse from the surface has been introduced into this "hard-pan" by sinking through the decaying substance of the roots of large trees that have been uprooted by a tornado. Let me quote his own words: "The explanation thus furnished of the distribution of the worked quartzes of this locality through the glacial deposits to the depth of four feet or more is so satisfactory that no other theories are called for, and little further discussion seems necessary." To my mind this explanation is just as satisfactory, and no more so, than Mr. Holmes's former explanation that "most of the so-called gravel implements of Europe are doubtless the rejects of manufacture."

Mr. Holmes first draws pretty pictures, and then draws from them the conclusion that "the record may be so altered in the period of a generation as to be read ten thousand years instead of fifty. Such is the magic of Nature's transformations, and such are the pitfalls set for unwary explorers." Miss Babbitt, the "unwary explorer" in the present instance, is no longer living to defend herself from such assumption as this, but I think all lovers of justice will feel that this is a pretty weak answer to her positive assertions. Mr. Holmes continues: "The mistakes made by Miss Babbitt are precisely such as others have made through taking

up investigations in the geologic department of archæology without adequate knowledge either of the processes and phenomena of geology, or of the arts and habits of our aboriginal peoples." I had supposed that such crass ignorance as this was confined, in Mr. Holmes's judgment, to myself; but it seems that there are others falling under a like condemnation. How fortunate it is for the rising generation that Mr. Wm. H. Holmes has appeared to set them quite right in regard to the prehistoric archæology of North America. HENRY W. HAYNES.

Boston, May 22.

Preliminary Note on Eggs of Cottus Richardsoni.

ONE finds in scientific literature so little relating to the habits of even some of our best-known fishes, that reliable information on piscine life-histories is much to be desired.

The little miller's thumb (*Cottus Richardsoni*, Agassiz) was found breeding plentifully in a large spring near Philadelphia on Apr. 29, and a fine lot of material for future embryological study procured.

The places selected for oviposition were invariably the fountain-heads of small, lateral springs which emptied into the main body of water, and where the water was freshest and coldest. No eggs were found at more than a few feet distance from a spring-head. In two or three cases the streams were so tiny that the fishes must have been forced almost to squirm along to the nesting-place. The greatest number, however, were found where a powerful current flowed from beneath an overhanging rock.

A passage is forced beneath a stone, which may be a mere pebble or a large boulder, and a small, shallow chamber hollowed out of the underlying soil, unless the stone be so supported that a natural chamber is formed beneath it. This accommodates the fishes during egg-laying and impregnation; and later serves the male as a resting-place. To the under side of the stone, which forms the roof of the chamber, the eggs are attached, not singly and in small clusters arranged in a single layer, as is the case with Batrachus and other fishes of similar habit, but in an irregular, coherent mass, in which the eggs are often piled up five or six deep, but in most cases are only two or three. The eggs, while very firmly coherent, are loosely arranged, giving the mass a very porous structure, which permits a free flow of fresh water. This is the more necessary since the eggs deeper in the mass are sometimes the first to hatch, when they frequently escape through the passages between the more superficial ones, the collapse of their own egg-membranes making additional room for those which follow. The number of eggs, and consequently the size and shape of the masses, varies, the eggs numbering from 120 to 500. In most cases all of the eggs in a mass were of approximately the same age; but several times, eggs in two or three stages of development were found together, the deepest, of course, being the most advanced. In the cases of most fishes, as is well known, the eggs all hatch, under favorable conditions, at the same time. Whether the several lots are deposited by different females, or whether the eggs are matured in several batches, and the female returns to complete oviposition, I cannot say.

The eggs when newly deposited are of a delicate, translucent, pink color. They average one-tenth of an inch in diameter, being large for the fishes' size, but are quite variable, and are often misshapen by contact with their fellows. As usual, the axis of the embryo passes through the lowermost pole, the dark, widely separated eyes being prominent objects on this side of the egg. There is no regularity about the direction of the embryonic axis, which, in the different eggs of a mass, is found to point in every direction.

Some of the eggs hatched while being conveyed home, and the young lived several days in an aquarium jar. They are very active little creatures, darting about in a most lively manner, often swimming to the surface and then sinking to the bottom, where they rest for a moment, before undertaking another excursion. This activity is exhibited from the time of hatching. When first hatched they are nearly a quarter of an inch long and far advanced in development. The pigmentation is very slight, there being no prominent aggregations of chromatophores anywhere except in the eyes, which are densely pigmented. Branched pigment cells are scattered sparingly, especially on the dorsum of the head.

In every case the eggs were attended by the males, which showed no disposition to desert their posts, but remained motionless, trusting to their protective coloration for concealment.

Several of these males, which were thrown alive into a satchel, seemed to suffer no inconvenience whatever through their absence from water for three hours, but were at once active when placed in a dish. J. PERCY MOORE.

Gophers and Moles.

IN the course of his interesting "Observations on Gophers and Moles" in your issue of April 28, Mr. F. L. Washburn makes mention of two moles which were fatally poisoned by eating worms taken from an old manure heap. I presume that the Oligocheta there identified as *Lumbricus fœtidus* are equivalent or closely allied to those known to fishermen on this side of the water as "brandlings" (*Allolobophora fœtida*), commonly found under manure and readily distinguished from the common earthworm (*Lumbricus terrestris*) by their display of brilliant red rings; and if this be so, I can add my testimony — founded on disastrous personal experience — that the unsavory annelid is toxic also to reptiles. This is somewhat remarkable, seeing that it is devoured with impunity by fish and amphibians. During a severe and prolonged frost, six or seven winters ago, when frogs and common earthworms were not to be obtained, I incautiously tendered a number of these brandlings to certain colubrine snakes, wild with hunger from enforced abstinence after casting their sloughs; they included several mocassins (*Tropidonotus fasciatus*), a Bordeaux snake (*Coronella girondica*), two garters (*Tropidonotus ordinatus*), two or three specimens of *Lamenis atrovirens*, and a whole brood of little Japanese vibakaris (*Tropidonotus vibakari*), born in my vivarium and the sole representatives of the species in Europe. The result was that within a very few minutes the whole lot, as well as a couple of South African slowworms and a large apadous lizard, the "glass snake" so-called (*Pseudopus pallasi*), were in violent convulsions; and although by prompt and vigorous measures I forced them to disgorge and got them all into hot baths as speedily as possible, I lost eight out of my forty-three vibakaris, the Bordeaux snake, both slow-worms, one dark green, and one garter — hideous evidence of the baleful virulence of the *fœtidæ* and the lamentable lack of instinctive discrimination on the part of the reptiles. Evidently the conspicuous coloration of this worm is not to be added to the list of protectives, since the creatures to which it is most exposed, frogs, toads, etc., prey on it with avidity. Serpents, as a rule, will not take worms unless they have been "taught" to do so — such tuition, however, being quite practicable. ARTHUR STRADLING, C.M.Z.S., etc.

Watford, England.

BOOK-REVIEWS.

Destructive Distillation. A Manualette of the Paraffin, Coal Tar, Rosin Oil, Petroleum, and Kindred Industries. By EDMUND J. MILLS, D.Sc. (London), F.R.S. Fourth edition. London, Gurney & Jackson. 200 p. 8°.

HISTORICALLY an ancient industry, this branch of scientific investigation has always proved most absorbing and as early as the sixteenth and seventeenth centuries upon it was concentrated the whole attention of the laboratory. Heat was considered in the medium of a reagent and in the retorts of the alchemists vegetable, animal, and mineral matter was subjected to "analysis." The above work by Dr. Mills, now in its fourth edition, with improvements including the results of much additional research, is founded upon a course of lectures delivered in Anderson College, Glasgow, and is illustrated by actual inspection of many of the processes referred to. Since the appearance of the first edition, in 1887, the book has found its way into the hands of every technical student and every chemist the world over. Dr. Mills has become a recognized "authority" upon the subject, deserving and receiving the highest praise for his patient, earnest research. The main sections of the book are indicated by the title,